

What is Claimed Is:

1. A composition for the *in vitro* chondrogenesis of human mesenchymal precursor cells and the *in vitro* formation of human chondrocytes therefrom, which composition comprises isolated human mesenchymal stem cells in a three dimensional format and at least one chondroinductive agent in contact therewith.

2. The composition of claim 1 wherein the mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells

3. The composition of claim 1 wherein the mesenchymal stem cells are in a chemically defined serum-free environment.

4. The composition of claim 1 wherein the mesenchymal stem cells are condensed into close proximity.

5. The composition of claim 1 wherein the mesenchymal stem cells are present as packed cells or a centrifugal cell pellet.

6. The composition of claim 1 wherein the chondroinductive agent is selected from the group consisting of (i) a glucocorticoid; (ii) a member of the transforming growth factor- β superfamily; (iii) a component of the collagenous extracellular matrix; and (iv) a vitamin A analog.

7. The chondroinductive agent of claim 6 wherein the glucocorticoid is dexamethasone.

8. The chondroinductive agent of claim 6 wherein the member of the transforming growth factor- β superfamily such as a bone morphogenic protein (preferably BMP-4), TGF- β 1, inhibin A or chondrogenic stimulating activity factor.

9. The chondroinductive agent of claim 8 wherein the bone morphogenic protein is BMP-4.

10. The chondroinductive agent of claim 6 wherein the component of the collagenous extracellular matrix is collagen I.

11. The chondroinductive agent of claim 10 wherein the collagen I in the form of a gel.

12. The chondroinductive agent of claim 6 wherein the vitamin A analog is retinoic acid.

13. The composition of claim 1 wherein the chondroinductive agent is a combination of dexamethasone and TGF- β 1.

14. A process for producing chondrocytes from mesenchymal stem cells by contacting mesenchymal stem cells with a chondroinductive agent *in vitro* where the stem cells are associated in a three dimensional format.

15. The process of claim 14 wherein the mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells.

16. The process of claim 14 wherein the mesenchymal stem cells are in a chemically defined serum-free environment.

17. The process of claim 14 wherein the mesenchymal stem cells are condensed into close proximity.

18. The process of claim ^H17 wherein the mesenchymal stem cells are present as packed cells or a centrifugal cell pellet.

19. The process of claim 14 wherein the chondroinductive agent is selected from the group consisting of (i) a glucocorticoid; (ii) a member of the transforming growth factor- β superfamily; (iii) a component of the collagenous extracellular matrix; and (iv) a vitamin A analog.

20. The process of claim 14 wherein the chondroinductive agent is a combination of dexamethasone and TGF- β 1.

21. The process of claim 14 wherein the step of contacting comprises culturing a pellet of human mesenchymal stem cells in a chemically defined serum-free medium.

22. The process of claim 21 wherein the chemically defined serum-free medium comprises (1) a chemically defined minimum essential medium; (2) ascorbate or an analog thereof; (3) an iron source; (4) insulin or an insulin-like growth factor; and (5) at least one chondroinductive agent or factor. *comprising a high glucose concentration*

23. The method of claim 14 wherein the cells are cultured with the chondroinductive composition and thereafter placed in a rigid porous vessel.

24. The method of claim 23 wherein the rigid porous vessel is a ceramic cube.

25. A process for inducing chondrogenesis in mesenchymal stem cells by contacting mesenchymal stem cells with a chondroinductive agent *in vitro* where the stem cells are associated in a three dimensional format.

26. The process of claim 25 wherein the mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells.

27. The process of claim 25 wherein the mesenchymal stem cells are in a chemically defined serum-free environment.

28. The process of claim 25 wherein the mesenchymal stem cells are condensed into close proximity.

29. The process of claim 25 wherein the mesenchymal stem cells are present as packed cells or a centrifugal cell pellet.

30. The process of claim 25 wherein the chondroinductive agent is selected from the group consisting of (i) a glucocorticoid; (ii) a member of the transforming growth factor- β superfamily; (iii) a component of the collagenous extracellular matrix; and (iv) a vitamin A analog.

31. The process of claim 25 wherein the chondroinductive agent is a combination of dexamethasone and TGF- β 1.



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APPL PARTS



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_____**A...**_____
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_____**SPEC**_____
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Specification Not in English

_____**TRNA**_____
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_____**CTNF**_____
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